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Xenobalistes tumidipectoris, a New Genus and Species of
Triggerfish (Tetraodontiformes, Balistidae) from the
Marianas Islands

By

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A specimen of a remarkable triggerfish (Balistidae) was found in the stomach contents of the marlinfish *Makaira mazara* (Istiophoridae) collected from off the Marianas Islands on July 9, 1960. It is readily distinguishable from all other balistids by having great protuberances just below the pectoral fins. Since this unusual character is not found in any other balistid, a dissection was made to ascertain if this specimen had any unique internal characters. Although the viscera of the specimen were completely digested by the stomach of *M. mazara*, the skeleton was still in good condition and shows uniqueness in the pectoral girdle, skull and the first dorsal fin. Thus, the specimen is here described as a new genus and species under the name of *Xenobalistes tumidipectoris*. The holotype, only known specimen, is deposited in the fish collection of the National Science Museum, Tokyo (NSMT-P).

Methods

Methods for counts and measurements follow MATSUURA (1980) with the following additions: greatest width of body, the distance between the lateral edges of the large protuberances below the pectoral fins; width of body, the distance between the regions just behind the gill openings; interorbital width, the distance between the lateral edges of the supraorbital ridges at the level of the center of the eye; least interorbital width, the distance between the anterior edges of the orbits. The number of vertebrae was obtained from a radiograph.

The specimen was cleared and stained with alizarin by TAYLOR's (1967) method after photographs were taken and drawings were made by the author.

Xenobalistes gen. nov.

Type-species. *Xenobalistes tumidipectoris* sp. nov.

Diagnosis. Same as for *X. tumidipectoris* sp. nov.

Xenobalistes tumidipectoris sp. nov.

[New Japanese name: Tsubasa-mongara]

(Figs. 1, 2)

Holotype. NSMT-P 18666, 60.5 mm in standard length (SL), collected from the stomach contents of *M. mazara* obtained from off the Marianas Islands ($20^{\circ}33'N$, $145^{\circ}15'E$) on July 9, 1960.

Diagnosis. A species of balistid with the following combination of characters: the region just below pectoral fin projected laterally to form a large rounded protuberance; supraorbital ridge well developed and convex dorsolaterally; no enlarged osseous scales behind gill opening; a short shallow groove before eye, below nostrils; the mid-lateral portion of coracoid greatly expanded to form a disk-like bone; dorsal and ventral postcleithra large and thick, the anterolateral portion of ventral postcleithrum articulated with the posterior part of disk-like region of coracoid; a small compressed bone, here named extra-supraneural, lying between supraneural and the first pterygiophore of the second dorsal fin; frontal greatly developed to cover large part of skull roof and its edge greatly convex.

Description of External Characters

Three spines in the first dorsal fin. Rays of the second dorsal fin completely missing because of digestion in the stomach of *M. mazara*. In anal fin anterior 10 rays countable, the other rays missing, as in the second dorsal fin. Pectoral fin with

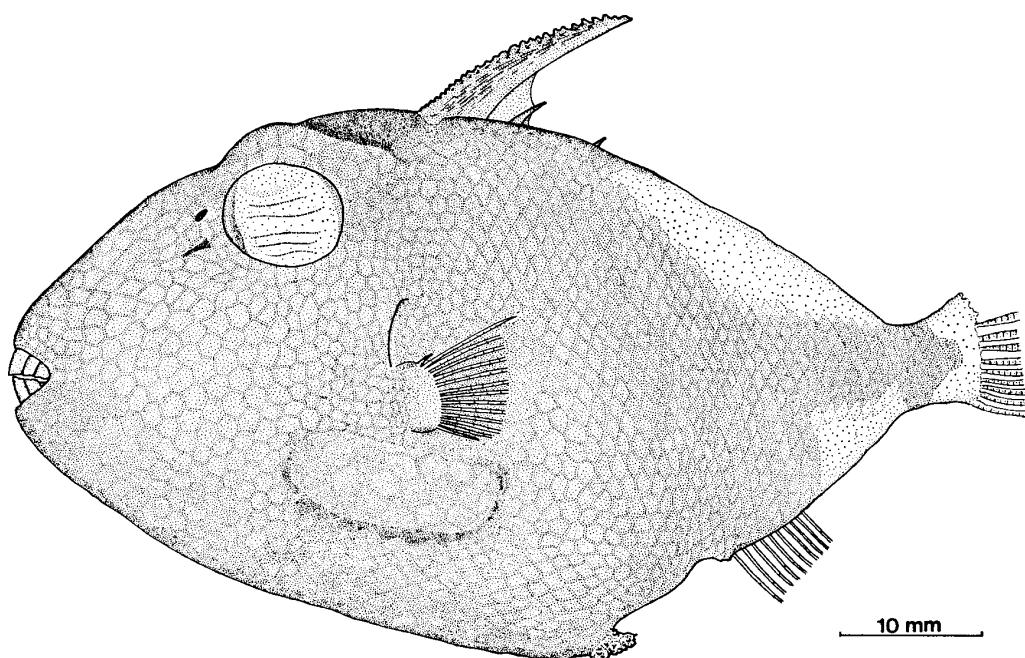


Fig. 1. Holotype of *Xenobalistes tumidipectoris* sp. nov., 60.5 mm SL, Marianas Islands, NSMT-P 18666.

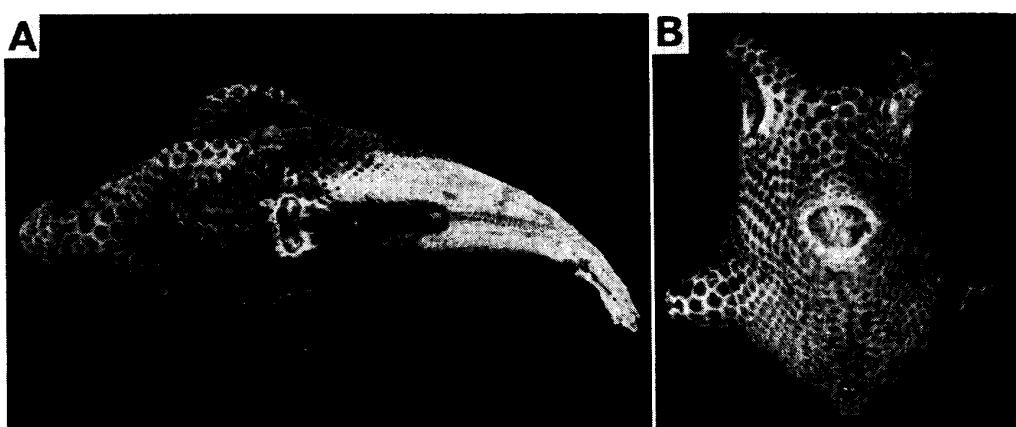


Fig. 2. Holotype of *Xenobalistes tumidipectoris* sp. nov. —A, dorsal view. —B, frontal view.

13 rays, this count excluding the uppermost short ray. Nine rays in caudal fin, three on the upper lobe and six on the lower; some rays from upper lobe obviously missing because of digestion. Head scale rows 21 and body scale rows 35. Vertebrae $7+11=18$.

Greatest depth of body 1.71, depth of body 2.57, greatest width of body 1.98, width of body 4.20, head length 2.34, snout length 3.76, snout to origin of first dorsal fin 2.00, snout to origin of second dorsal fin 1.39, snout to origin of anal fin 1.30, base of second dorsal fin 3.44, base of anal fin 3.78—all in SL.

Eye diameter 3.31, interorbital width 1.38, least interorbital width 2.32, length of gill opening 5.16, length of caudal peduncle 4.96, depth of caudal peduncle 4.78, length of first dorsal spine 1.79—all in head length.

Body oval, rather deep and compressed except for expanded region under pectoral fin. Dorsal and ventral profiles of head similarly convex. Eye large, located posteriorly on head. Several longitudinal slits on eye ball, although they may be caused by digestion in the stomach of *M. mazara*. Supraorbital ridge well developed and expanded dorsolaterally. A short shallow groove before eye, below nostrils. Nostrils close together just in front of eye. Gill opening almost vertical, no enlarged osseous scales behind gill opening. The region just below pectoral fin projected laterally to form a large rounded protuberance, width of its base about equal to length of first dorsal spine. First dorsal spine long and stout, originating over gill opening, its anterior surface covered with two rows of downward directed small barbs; second spine slender; third spine short, extending slightly above dorsal edge of body. Rays of second dorsal fin completely missing because of digestion, but origin and termination of the base of the fin discernible by the marks of bases of the first and last rays. Anal fin originating slightly posterior to second dorsal fin, its rays also missing except for anterior 10 rays. Pectoral fin short, located between gill opening and a large rounded protuberance. Incasing scales at end of pelvis movable dorso-ventrally, composed of four segments. Caudal peduncle compressed, deeper than wide. Caudal fin greatly damaged, only nine rays recognizable, six on the lower lobe and three on the upper.

Body covered with more or less imbricate plate-like scales except for damaged portions around bases of second dorsal fin, posterior half of anal fin, and caudal fin. Scales rhomboidal and overlapping, with many coarse nodules (Fig. 3).

Mouth small, terminal, with thin lips. Teeth very sturdy, incisiform and notched distally; four outer and three inner on each premaxillary, and four in a single row on each dentary.

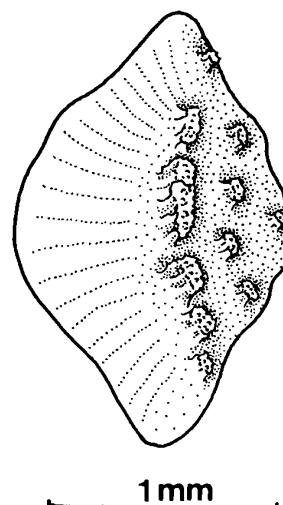


Fig. 3. Scale of *Xenobalistes tumidipectoris* sp. nov. from below origin of second dorsal fin.
Anterior to left.

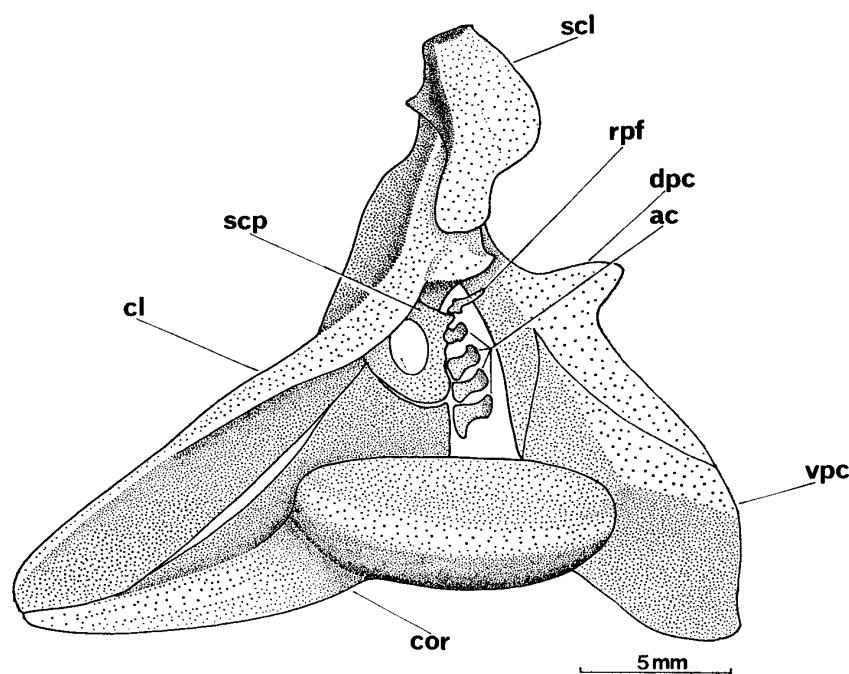


Fig. 4. Lateral view of pectoral girdle of *Xenobalistes tumidipectoris* sp. nov.
ac, actinosts; cl, cleithrum; cor, coracoid; dpc, dorsal postcleithrum; rpf, rudimentary pectoral fin ray; scl, supracleithrum; scp, scapula; vpc, ventral postcleithrum.

Color in alcohol: dark brown dorsally, becoming lighter ventrally; teeth white; rays of pectoral, anal and caudal fins pale.

Description of Osteological Characters

Since the new species has the same osteological conditions in many skeletal regions as those of other balistids, the description is here confined to the three important characters clearly distinguishing the new species from all of the other balistids.

Pectoral girdle. The pectoral girdle of the new species is clearly different from that of the other balistids in the features of the posttemporal, coracoid and postcleithra. The posttemporal is articulated dorsally with the expanded posteroventral part of the frontal. The coracoid is greatly expanded laterally to form a large disk-like portion which supports the large rounded protuberance below the pectoral fin (Fig. 4). The dorsal and ventral postcleithra are enlarged and thick. The ventral postcleithrum is articulated anteroventrally with the posterior part of the disk-like portion

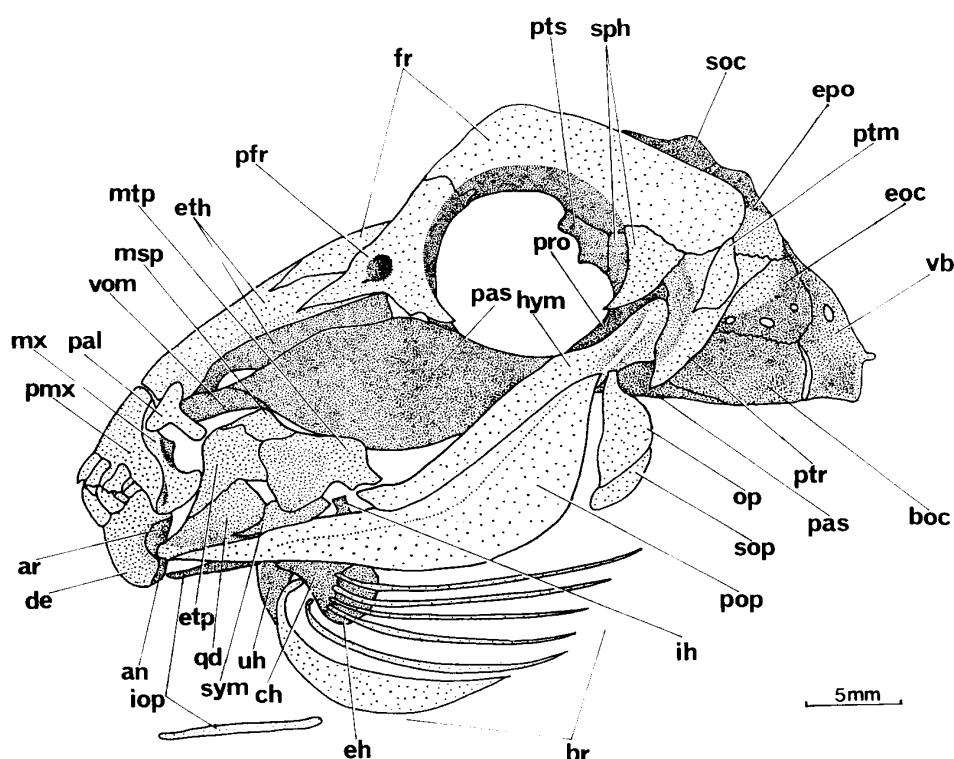


Fig. 5. Lateral view of head of *Xenobalistes tumidipectoris* sp. nov. an, angular; ar, articular; boc, basioccipital; br, branchiostegal rays; ch, ceratohyal; de, dentary; eh, epihyal; eoc, exoccipital; epi, epiotic; eth, ethmoid; etp, ectopterygoid; fr, frontal; hym, hyomandibular; ih, interhyal; iop, interoperculum; msp, mesopterygoid; mtp, metapterygoid; mx, maxillary; op, operculum; pal, palatine; pas, parasphenoid; pfr, prefrontal; pmx, premaxillary; pop, preoperculum; pro, prootic; ptm, posttemporal; ptr, pterotic; pts, pterosphenoid; qd, quadrate; soc, supraoccipital; sop, suboperculum; sph, sphenotic; sym, symplectic; uh, urohyal; vb, first abdominal vertebra; vom, vomer.

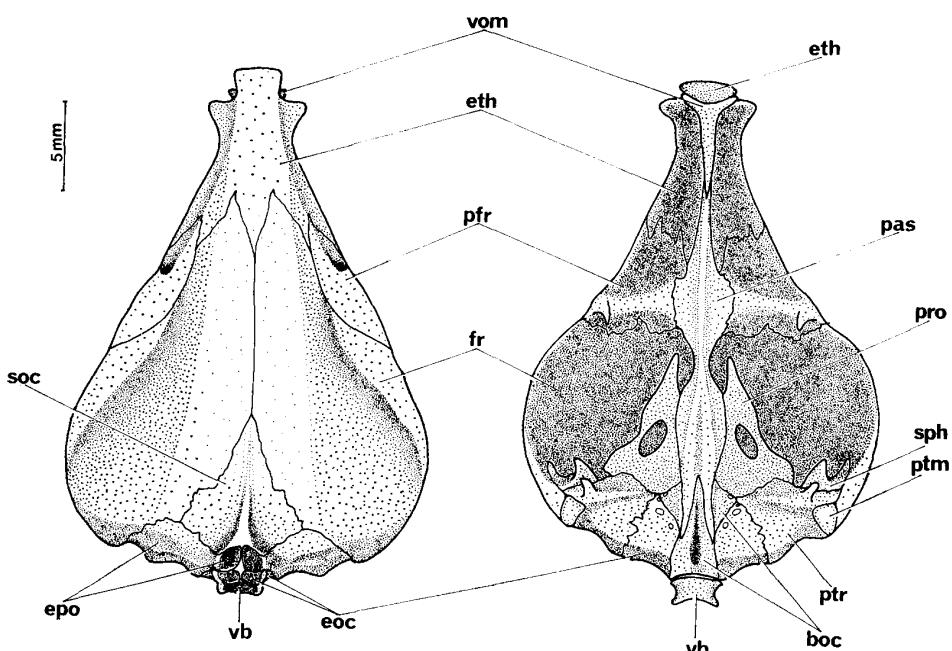


Fig. 6. Dorsal (left) and ventral (right) views of skull of *Xenobalistes tumidipectoris* sp. nov.
Abbreviations as in Fig. 5.

of coracoid.

Skull. Except for the frontal, the bones of skull show no significant differences from those of the other balistids (Figs. 5, 6). The frontal is greatly enlarged laterally and posteriorly to cover a large part of the skull roof. At its lateral edge the frontal is convex dorsally to form the supraorbital ridge. Posteroventrally the frontal is articulated with the dorsal end of the posttemporal.

First dorsal fin. Although the first dorsal fin of the new species has the same trigger-like structure as found in the other balistids, it has an additional small compressed bone, here named the extra-supraneural, which is absent in all other balistids. This bone is placed between the supraneural and the first pterygiophore of the second dorsal fin, and is connected with them through a sheet of connective tissue (Fig. 7).

Discussion

The new species at first sight seems to have some relationships with the ostracioid fishes, because it has large protuberances which seem similar to the ventrolateral ridges of ostracioids in frontal view, and it also has well-developed supraorbital ridges.

However, the pelvic complex (Figs. 8, 9) and three dorsal spines indicate that the new species undoubtedly belongs to the family Balistidae. This classification is confirmed by the fact that the new species shows typical balistid characteristics in the following skeletal parts: the suspensorium and jaws (Fig. 5), the caudal skeleton (Fig. 9), the hyoid apparatus (Fig. 10), and the gill arches (Fig. 10). Although these characters provide strong evidence to allocate the new species to the Balistidae, they

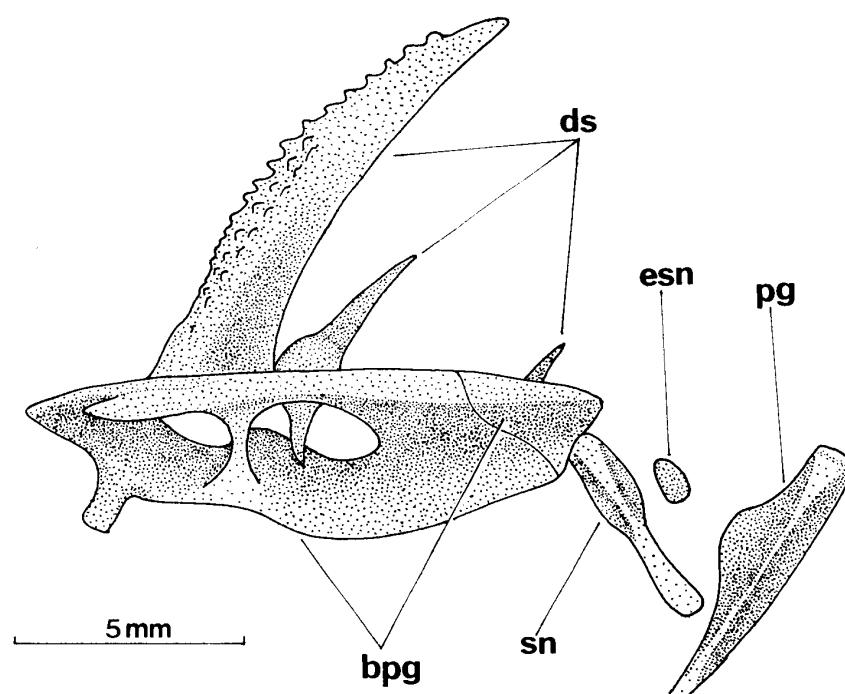


Fig. 7. First dorsal fin, its pterygial supports, and first pterygiophore of second dorsal fin of *Xenobalistes tumidipectoris* sp. nov. — bpg, basal pterygiophores; ds, dorsal spines; esn, extra-supraneurals; pg, first pterygiophore of second dorsal fin; sn, supraneurals.

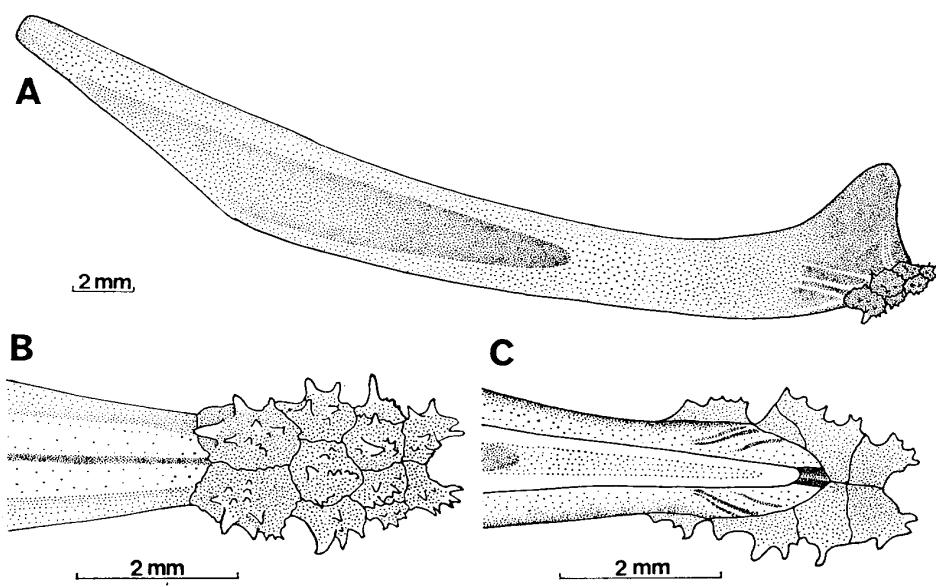


Fig. 8. Pelvis and incasing scales of *Xenobalistes tumidipectoris* sp. nov. — A, lateral view. — B, ventral view of posterior part of pelvis and incasing scales. — C, dorsal view of posterior part of pelvis and incasing scales.

do not throw light on the relationships between the new species and the other balistids. On the other hand, the pectoral girdle, skull and the first dorsal fin of the new species offer much information to clarify its relationships.

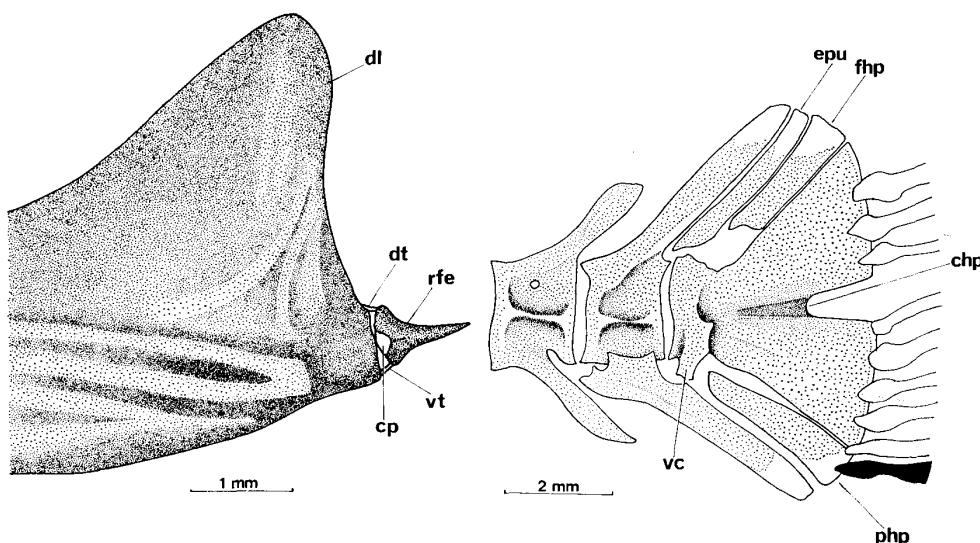


Fig. 9. Posterior part of pelvis in *Xenobalistes tumidipectoris* sp. nov., with incasing scales removed to expose rudimentary fin ray element and associated structures (left), and caudal skeleton and fin rays (right); solid region indicates unbranched ray, open regions show branched rays. chp, centrum-hypural plate; cp, cartilage plug; dl, dorsal lobe; dt, dorsal tendon; epu, epural; fhp, free hypural; php, parhypural; rfe, rudimentary fin ray element; vc, vertical crest; vt, ventral tendon.

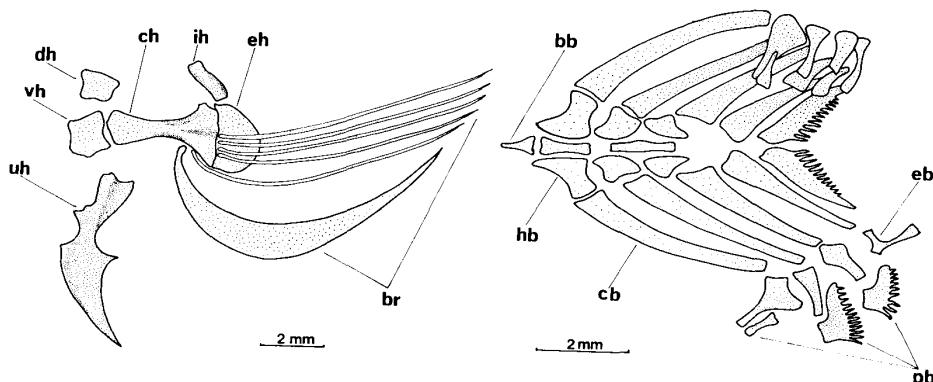


Fig. 10. Lateral view of hyoid apparatus (left) and dorsal view of branchial arches (right) in *Xenobalistes tumidipectoris* sp. nov. bb, basibranchials; br, branchiostegal rays; cb, ceratobranchials; ch, ceratohyal; dh, dorsal hypohyal; eb, epibranchials; eh, epihyal; hb, hypobranchials; ih, interhyal; pb, pharyngobranchials; uh, urohyal; vh, ventral hypohyal.

The new species is unique among the balistids in having a disk-like portion of the coracoid which is articulated with the anteroventral part of the enlarged ventral postcleithrum. Since this remarkable character is not found in any of the other tetraodontiforms and teleosteens, it seems reasonable to presume that this unique pectoral girdle has been derived from the normal pectoral girdle as seen in the other balistids. In other words, the pectoral girdle of the new species is more advanced than that of the other balistids.

In many balistids the frontal is not extended posteriorly beyond the level of the

posttemporal. In the new species the frontal is greatly expanded laterally and posteriorly, and articulated posteroventrally with the dorsal end of the posttemporal. To answer the question whether or not this unique condition of the frontal represents an advanced state, it is necessary to compare the new species with the triacanthids and ostracioids. In the triacanthids, which are accepted to be ancestral to the balistids (TYLER, 1968, 1980), the frontal is not enlarged but rather similar to that of many balistids. On the other hand, in the ostracioids, which are considered to be more advanced than the balistids (TYLER, 1980), the frontal is greatly enlarged as found in the new species. Of the ostracioid fishes, the primitive aracanids are more similar to the new species than the advanced ostraciids in the structure of the frontal.

Judging from these facts, the frontal of the new species is considered more advanced than that of the other balistids. However, there remains a problem how to evaluate the articulation between the frontal and the posttemporal. *Abalistes stellatus*, one of the advanced balistids (MATSUURA, 1979; TYLER, 1980), provides a clue to clarify this problem. If in the adult of *A. stellatus* the posteroventral part of the frontal is enlarged ventrally and the posterior part of the sphenotic is reduced, the frontal articulates with the dorsal end of the posttemporal (see fig. 40B in MATSUURA, 1979). Thus, it seems most reasonable to assume that the articulation between the frontal and the posttemporal represents an advanced condition rather than a primitive one.

The first dorsal fin of the new species is very peculiar among the balistids in having an extra-supraneurial. It is not difficult to answer whether this bone represents a primitive or advanced state. A reductive tendency in the first dorsal fin has been found in the balistoids and throughout the tetraodontiforms (FRASER-BRUNNER, 1935;

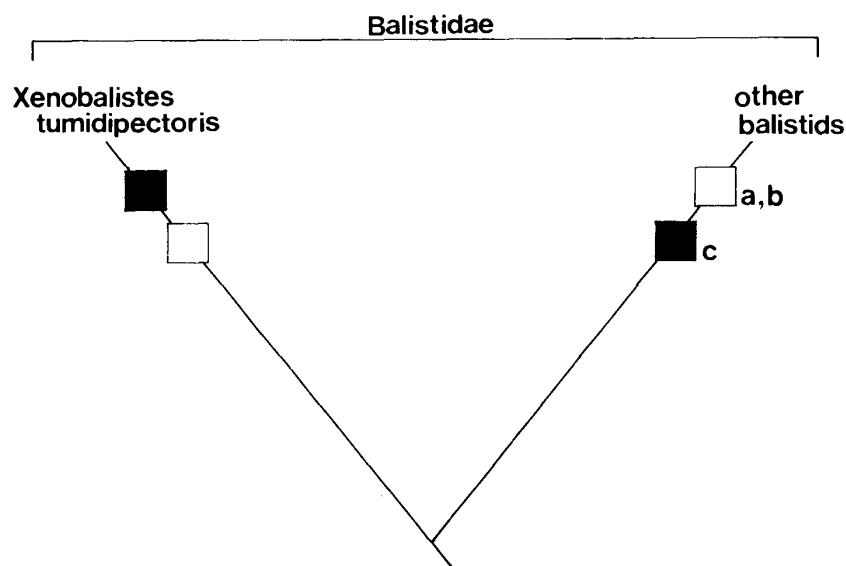


Fig. 11. Diagram showing phylogenetic relationships of *Xenobalistes tumidipectoris* sp. nov. and other balistids. Solid boxes indicate advanced character states and open boxes primitive character states. a, pectoral girdle; b, frontal; c, first dorsal fin.

MATSUBARA, 1955; MATSUURA, 1979; TYLER, 1980). In other words, the forms with the most elements in the first dorsal fin and its supports are considered to be more primitive. Thus, the extra-supraneural is regarded as an indicator of a primitive state.

As mentioned above, the new species unquestionably should be placed in the Balistidae, while it is distinctly different from all other genera of balistids. The mosaic of conditions in the three osteological characters, that is, the advanced states in the pectoral girdle and frontal and primitive state in the first dorsal fin, shows that the new species has evolved into a line which is clearly different from an other line leading to the other balistids (Fig. 11).

Etymology

The generic name, *Xenobalistes*, is derived from the peculiarity (*xeno*=strange or foreign) of the new species among the balistids. The species name, *tumidipectoris*, is given in allusion to the greatly expanded coracoid supporting the large rounded protuberance just below the pectoral fin.

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